

ADAPTIVE EQUIPMENT:

INEXPENSIVE, CUSTOM-DESIGNED . . DO IT YOURSELF!

Developed and Compiled By:

Lenor Davis, RPT
Sherrilyn Hawkins, OTR
Laurie Raymond, OTR

Educational Service Region
of Cook County
Dr. Richard J. Martwick
Administrative Agent

Chicago Regional Project
ECIA Chapter I 89-313
Reginald L. Hanks
Project Director

Chicago Regional Project-Chapter I
230 West Superior, 7th Floor
Chicago, IL 60610
(312) 440-4906

COPYRIGHT © 1979, by
CHICAGO REGIONAL PROJECT
ESEA Title I 89-313
Educational Service Region Cook County
Chicago, Illinois

ACKNOWLEDGEMENTS

We would like to take this opportunity to thank all the people who made significant contributions toward the preparation of this book and the equipment presented here.

Bertha S. Murray, Division Director; Patricia B. Stahl, Coordinator; Dr. William R. Zbinden, Executive Director; and Dr. Richard J. Martwick, Administrative Agent; Chicago Regional Project - Title I, gave us the opportunity and encouragement to design and construct the equipment, and compile this book.

The staff at the Educational Resource Center, 735 Sheridan Road, Chicago, provided space for us to work, tools, and materials, as well as valuable advise.

The staff and students at our schools gave us the inspiration to make the equipment.

A special thank you goes to Lena Pirko, an able editor and talented typist.

TABLE OF CONTENTS

Cardboard Carpentry

Why Cardboard (Tri-Wall)	1
Tools Needed to Work with Tri-Wall	2
Construction Methods	3

Equipment to Meet a Variety of Therapy Objectives for a Variety of Children

Vestibular Board	7
Rocker Board	11
T-Stool	15
Stilts - Coffee Can	17
Hammock Frame	19
Toy Bar	23

Equipment to Meet Specific Objectives for Specific Children

Chairs and Tables	27
Corner Chair and Table - Version 1	28
Corner Chair and Table - Version 2	33
Basic Chair and Table	39
High Back Chair: Variation of Basic Chair	45
Roll Chair	51
Scooter Board Seat	55
Prone Liers	57
Version 1	58
Version 2	60
Version 3	62
Kneeler	67
Wagon	71
Knee Splints	75
Feedback Head Control Device	77
Easel	81

CARDBOARD CARPENTRY

One of the simplest and more economical methods for constructing therapy equipment is cardboard carpentry.

Cardboard carpentry: constructing furniture, toys, adaptive equipment from Tri-Wall, a triple thick cardboard.

A. Why Cardboard (Tri-Wall)

1. Tri-Wall is inexpensive compared to wood.
Ex. \$5.00 for 4' X 6' sheet Tri-Wall versus
\$15.00 for 4' X 8' sheet plywood
2. Tri-Wall is lightweight.
3. Tri-Wall is sawdust free if the proper tools are used.
4. Tri-Wall, finished or unfinished, doesn't splinter.
5. Tri-Wall doesn't have to be finished, or if finished, it is generally a faster process than with wood (no sanding).
6. Tri-Wall provides optional performance. If it is treated well and constructed with tape, paint, plastic, Tri-Wall can be made to last indefinitely even under rough treatment. On the other hand, it can be constructed quickly, using little or no finishing techniques, deliberately serving for only the present.
7. The skills necessary to work with Tri-Wall are very easy to acquire, being for the most part, skills we already have.
8. Tri-Wall is a forgiving material - a fairly straight cut is usually as good as a perfectly straight one.
9. Most important, we can make adaptive equipment by ourselves, quickly, easily, and free from the necessity of describing or justifying what we want and need to carpenters, purchasing agents, etc.

However, we found that some types of equipment can be made faster and be sturdier when constructed from wood. For example, T-stool, hammock frame, tilt board.

B. Tools Needed to Work with Tri-Wall

1. The following tools are readily available and inexpensive and are all that is needed to construct with Tri-Wall.

- paring knife: serrated or scalloped edge is easiest.
- utility knife (matte knife): knife with razor type cutting blade that can be replaced when dull. You can cut a straight line by making the blade run alongside a metal ruler.
- handsaw: saws straight lines quickly.
- keyhole saw: saws curves.
- hammer
- mallet
- C-clamps, string clamps, and/or weights: to hold things together while you glue.
- rulers, tape measures

2. A sabre saw is the fastest method of cutting straight and curved pieces. If you use a knife blade (available from Sears through the catalog), there is no sawdust and the edges are smooth. If you clamp a metal ruler or 2" X 2" pieces of wood on line, you can saw a very straight line.

3. The following tools were constructed especially for cardboard carpentry and are available through the catalog from Workshop for Learning Things, Inc., 5 Bridge Street, Watertown, MA 02172.

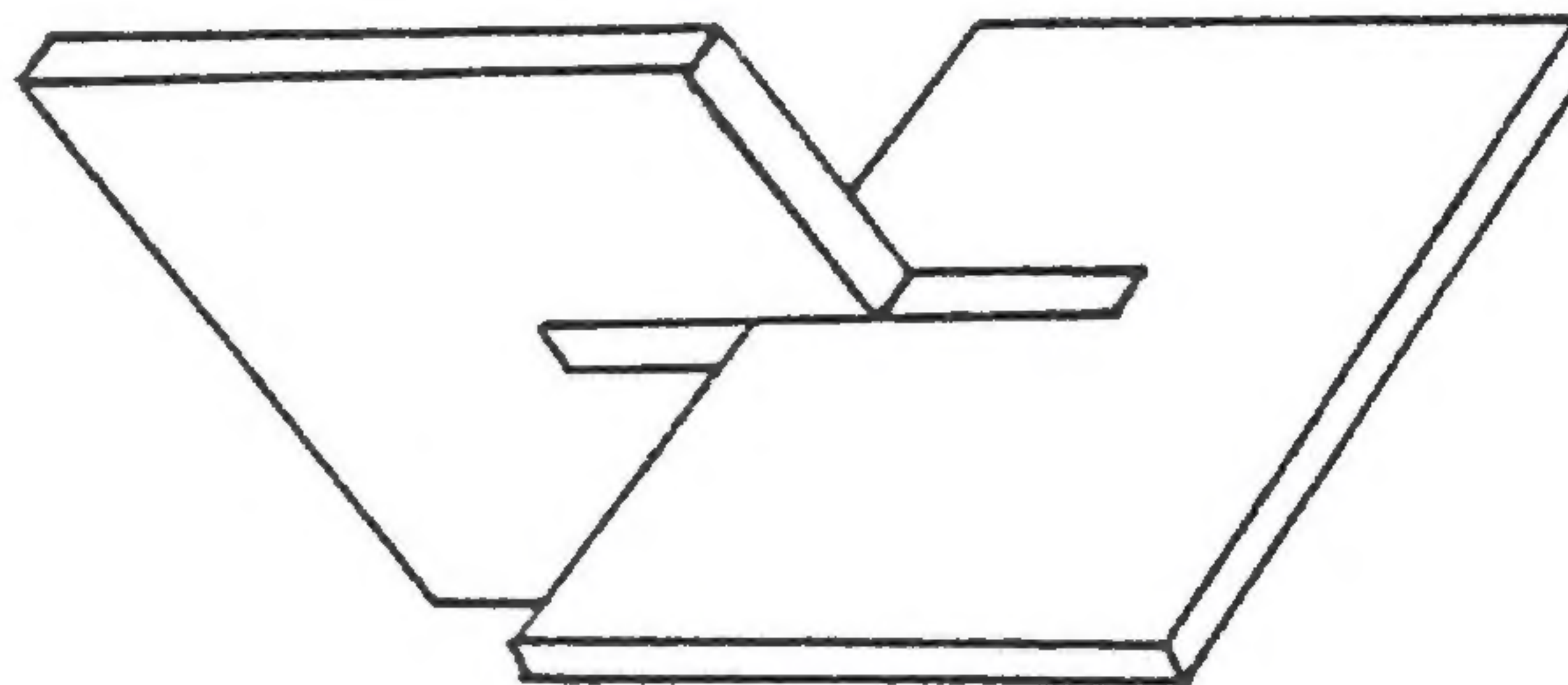
- strip cutter: X-acto blade tool cuts strips from $\frac{1}{2}$ " to 30".
- slot cutter: cuts slots accurately.
- V-groove cutter: cuts a V groove in cardboard, along which the cardboard can be creased for folded.
- thread cutters: tap and die for making large nuts and bolts from dowels and wooden squares.

- circle cutters: several different circle cutters are available that can cut circles from $\frac{1}{2}$ " to 54".
- double bladed hacksaw: a regular hacksaw with two blades for cutting slots.

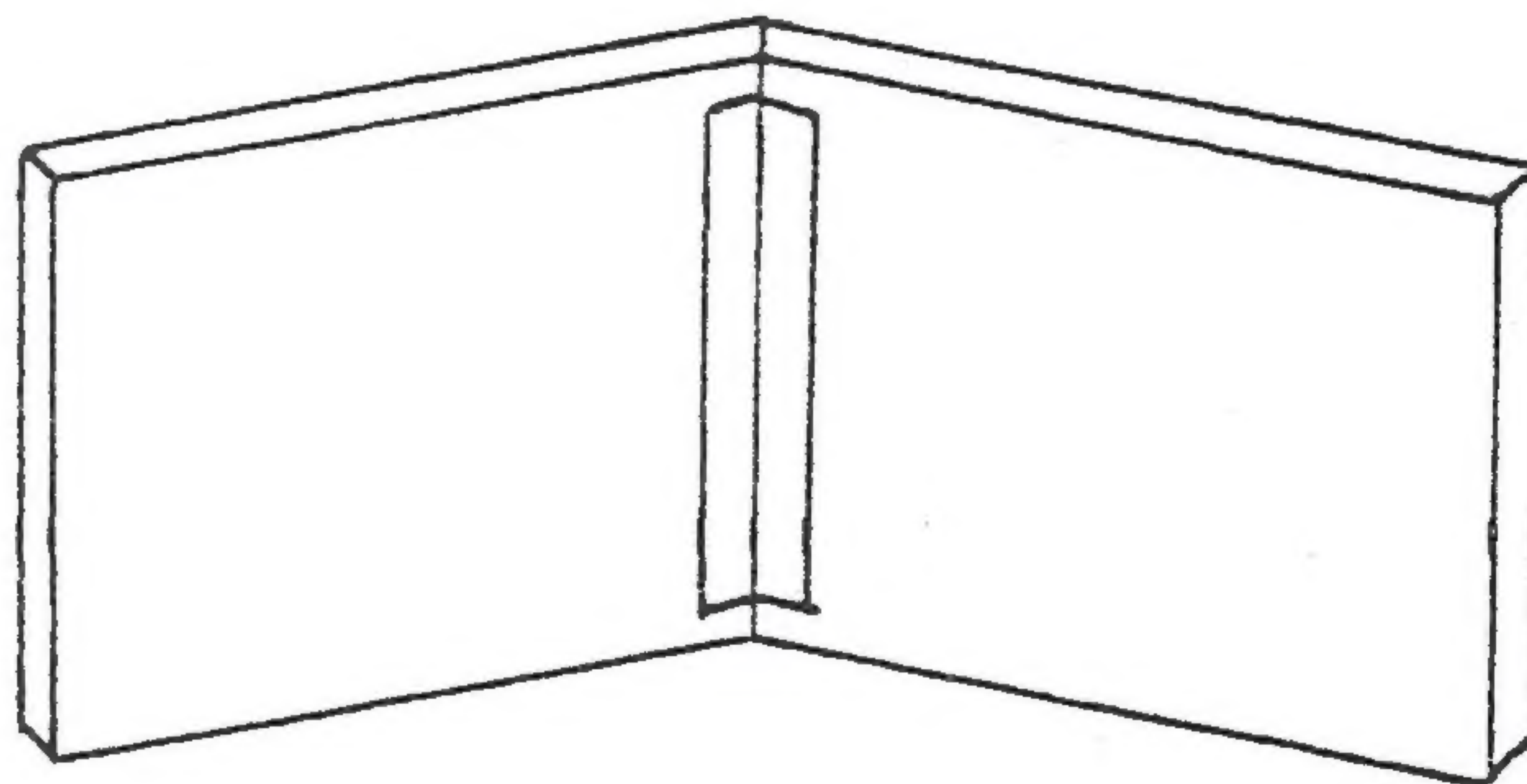
C. Construction Methods

1. Methods of joining cardboard include:

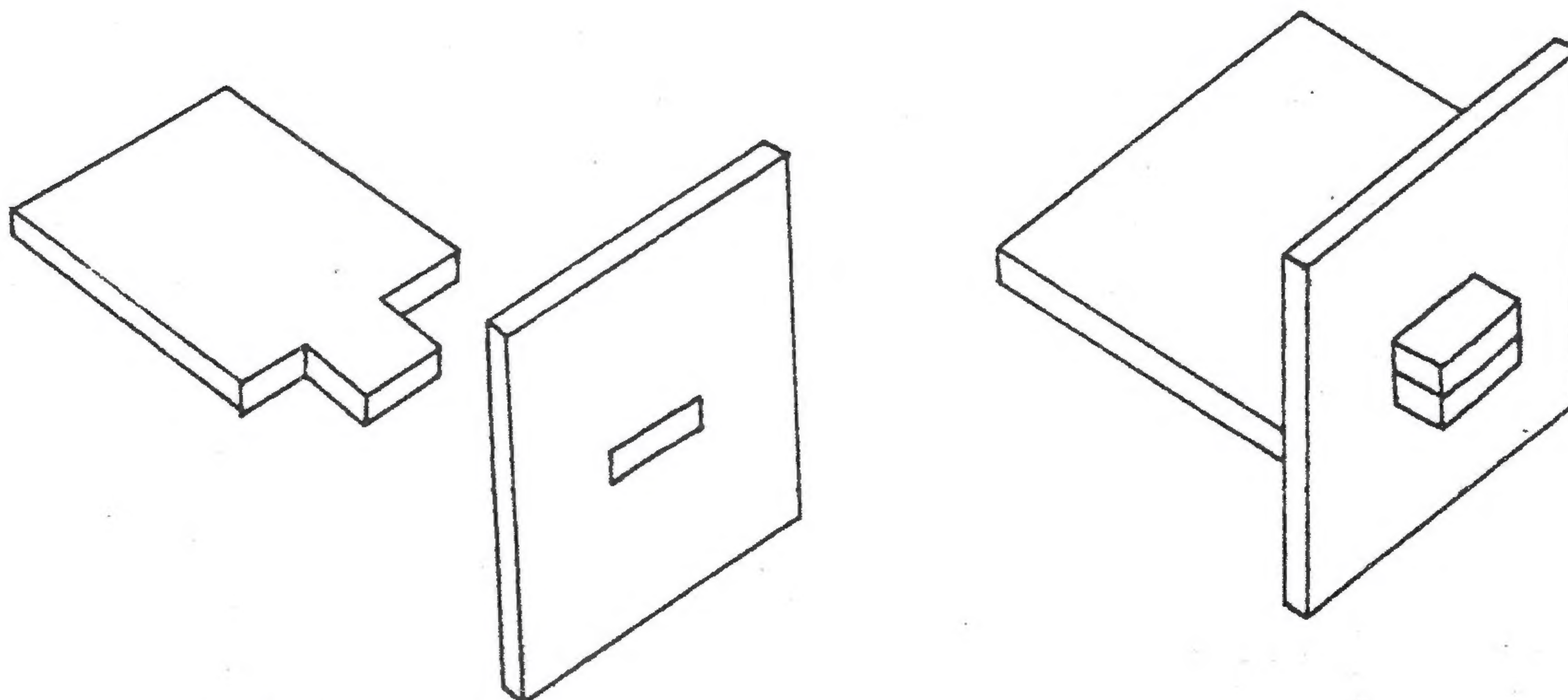
- Slots: a slot $\frac{1}{2}$ of width is cut in both pieces to be joined. The width of slot is width of Tri-Wall. The slot needs to be at least $2\frac{1}{2}$ " from edge of Tri-Wall.



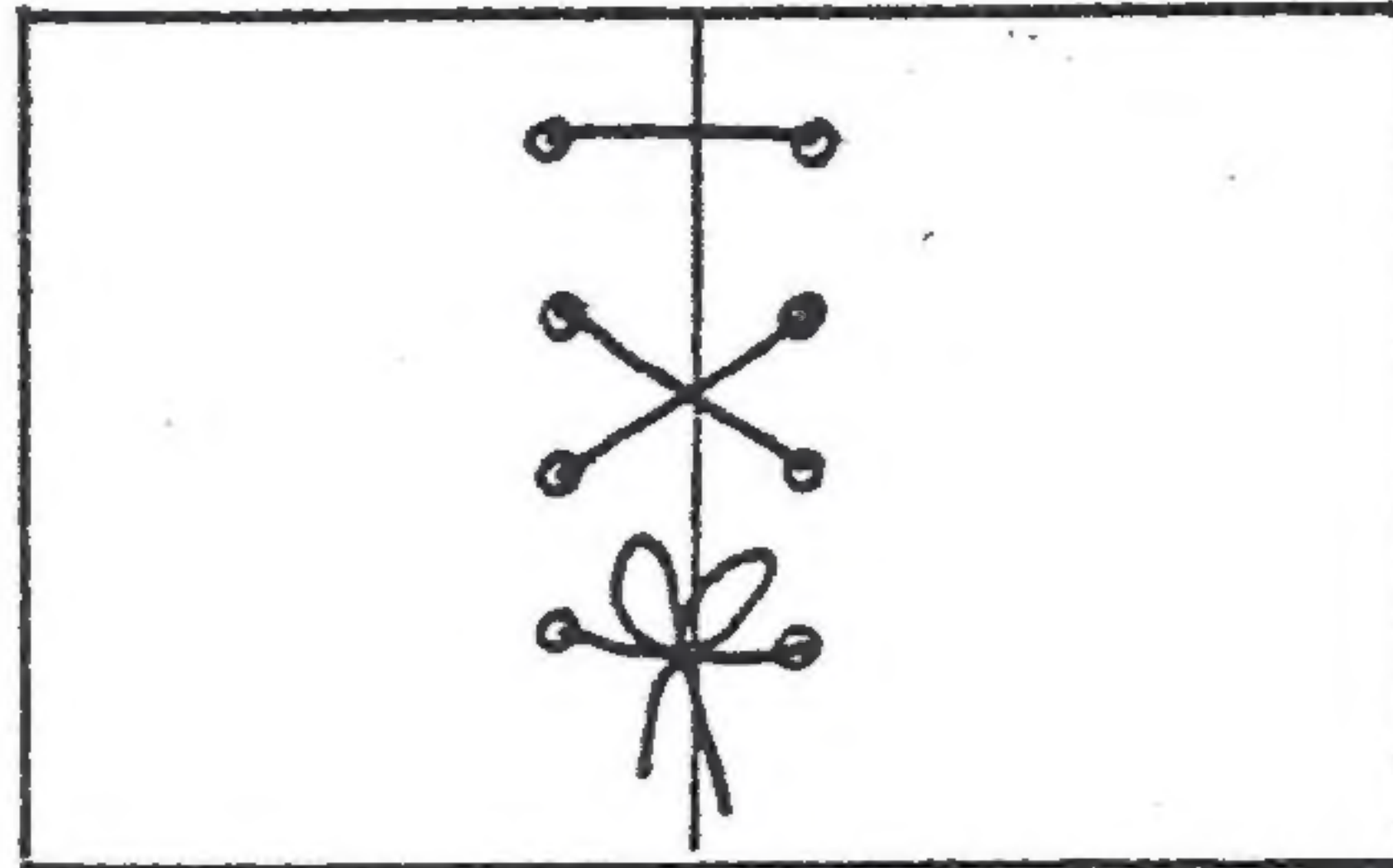
- Tape: paper tape, cloth tape, sticky tape; tape needs to be 2" wide.



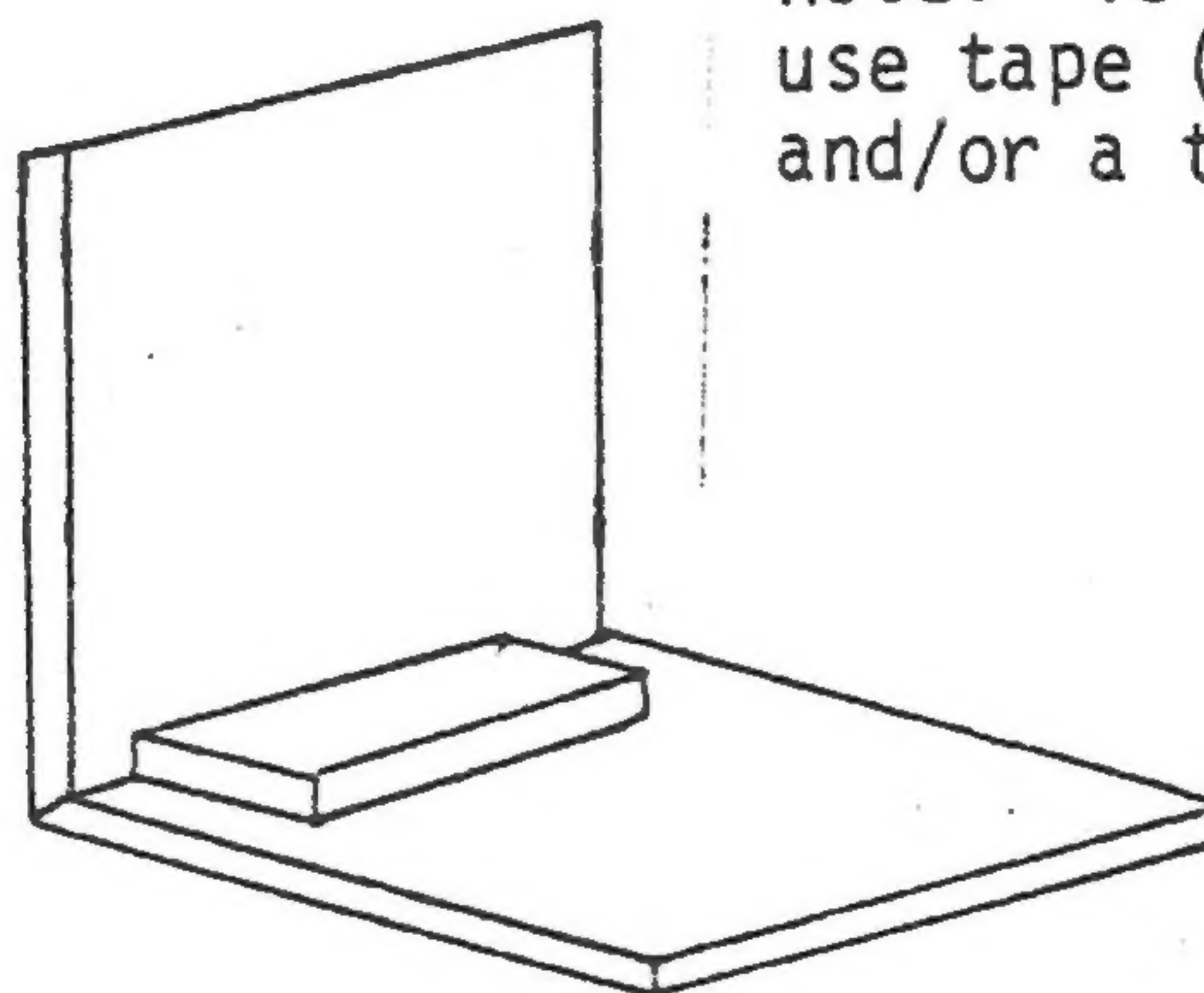
- Slot and Tongue:



- d. Pegging and Glueing: Use $\frac{1}{4}$ " dowel, mushroom top by pounding on with a mallet. Sharpen other end in pencil sharpener. Start hole, dip in glue, and finish pounding peg in.
- e. Lacing: Make holes in pieces to be joined at least 1" from the edge. Use rope and lace the edges together.



- f. Strips of Tri-Wall: Use strips of Tri-Wall along edges to be joined. Glue and tape strips to the pieces being connected.



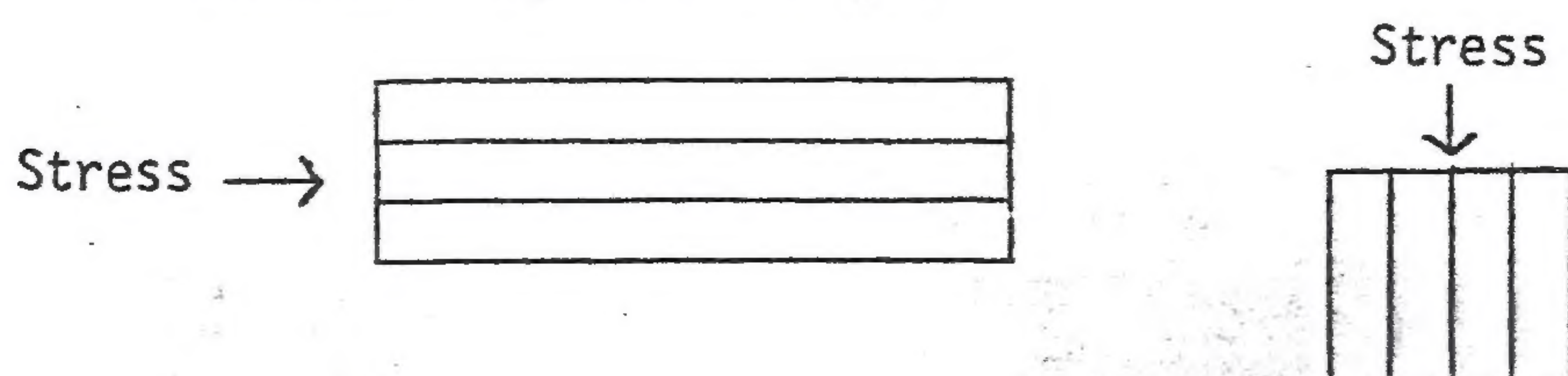
Note: To reinforce all joints you can use tape (2" as described in #b above) and/or a thread of glue along joint edges.

2. Methods of Folding Cardboard

Ex. make a corner

- a. Score with screwdriver, pound a $\frac{1}{2}$ " to $\frac{3}{4}$ " dowel along fold-line. Bend toward crushed side.
- b. Make a V groove on the side of the cardboard inside the fold. Can use a mat knife or paring knife. Make sure you don't cut through the final thickness of the cardboard.

Note: The cardboard has a grain. Generally, the heaviest stress should be against the grain.



D. Finishing Methods

1. Tape edges with 2" tape for a more finished look.
2. Paint
3. Cover with cloth, vinyl, burlap - folding around edges and taping.
4. Cover with contact paper, wallpaper.
5. Cover with plastic to waterproof.

Note: If you paint or glue one side of the cardboard, it can warp.
It is recommended that you do both sides if possible or else
take precautions against warping.

Can you come up with any ideas for adaptive equipment made from cardboard?

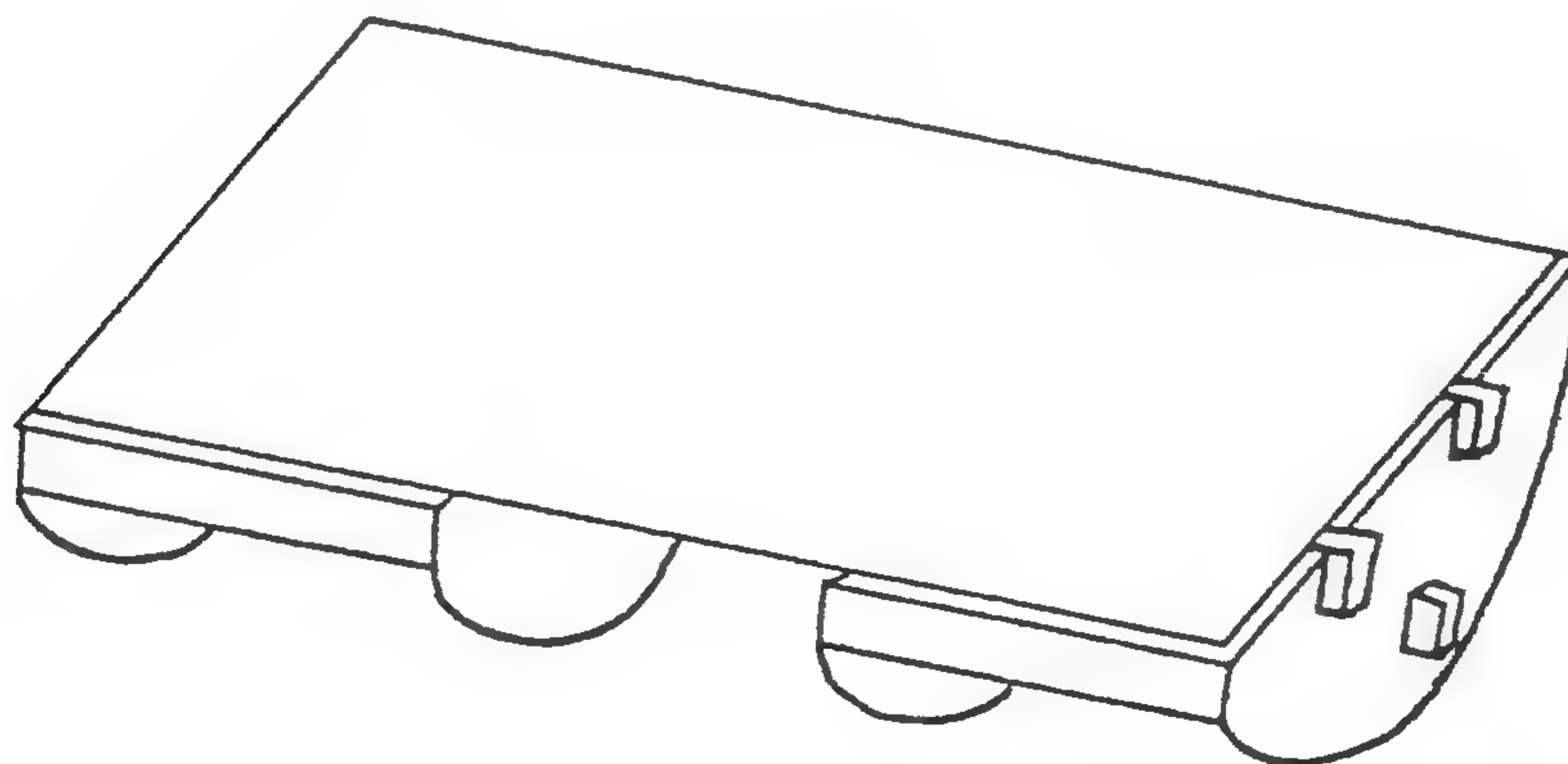
EQUIPMENT TO MEET A VARIETY OF THERAPY OBJECTIVES
FOR A VARIETY OF CHILDREN

VESTIBULAR BOARD

- 1) To facilitate righting, equilibrium, and balance reactions in the prone, supine, sitting, 4 point, kneeling, and standing positions.
- 2) To enable weight bearing and weight shifting in upper and lower extremities.
- 3) To stimulate trunk rotation.
- 4) To increase head and trunk control.
- 5) To provide stimulation of vestibular system in all positions.
- 6) To allow portability of Vestibular Board: classroom to classroom and by car.
- 7) To allow for availability of Vestibular Board at a fraction of the retail cost.

Precautions and Considerations:

- 1) Do not leave student unattended on board.
- 2) Take precautions to keep child from falling off the board.
- 3) Be aware of overstimulating or overinhibiting the student- watching for extreme fearfulness, pallor, hyperventilation, perspiration, sudden drowsiness, or dizziness.
- 4) Try to incorporate games into activity to divert attention.
- 5) Prevent board from rocking by placing small blocks under each end of board (check to see if it slips).



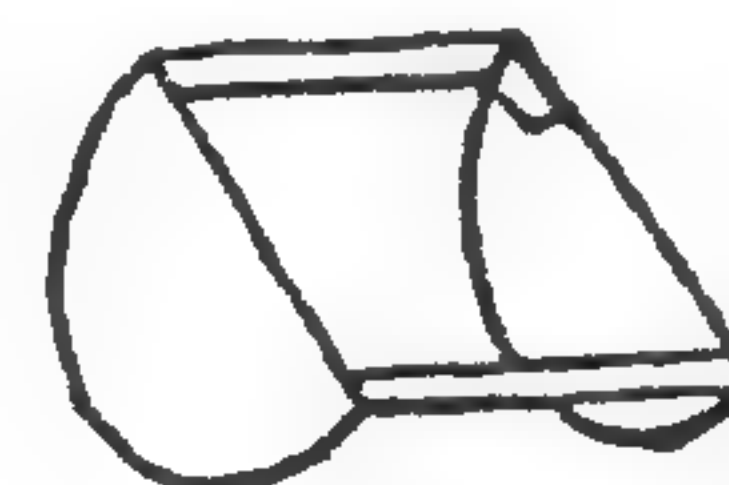
VESTIBULAR BOARD

Supplies: Tri-wall
white glue
2" gummed tape
piece of rug 43" X 28"
floor adhesive
paint

Estimated Cost: \$15.00

Directions:

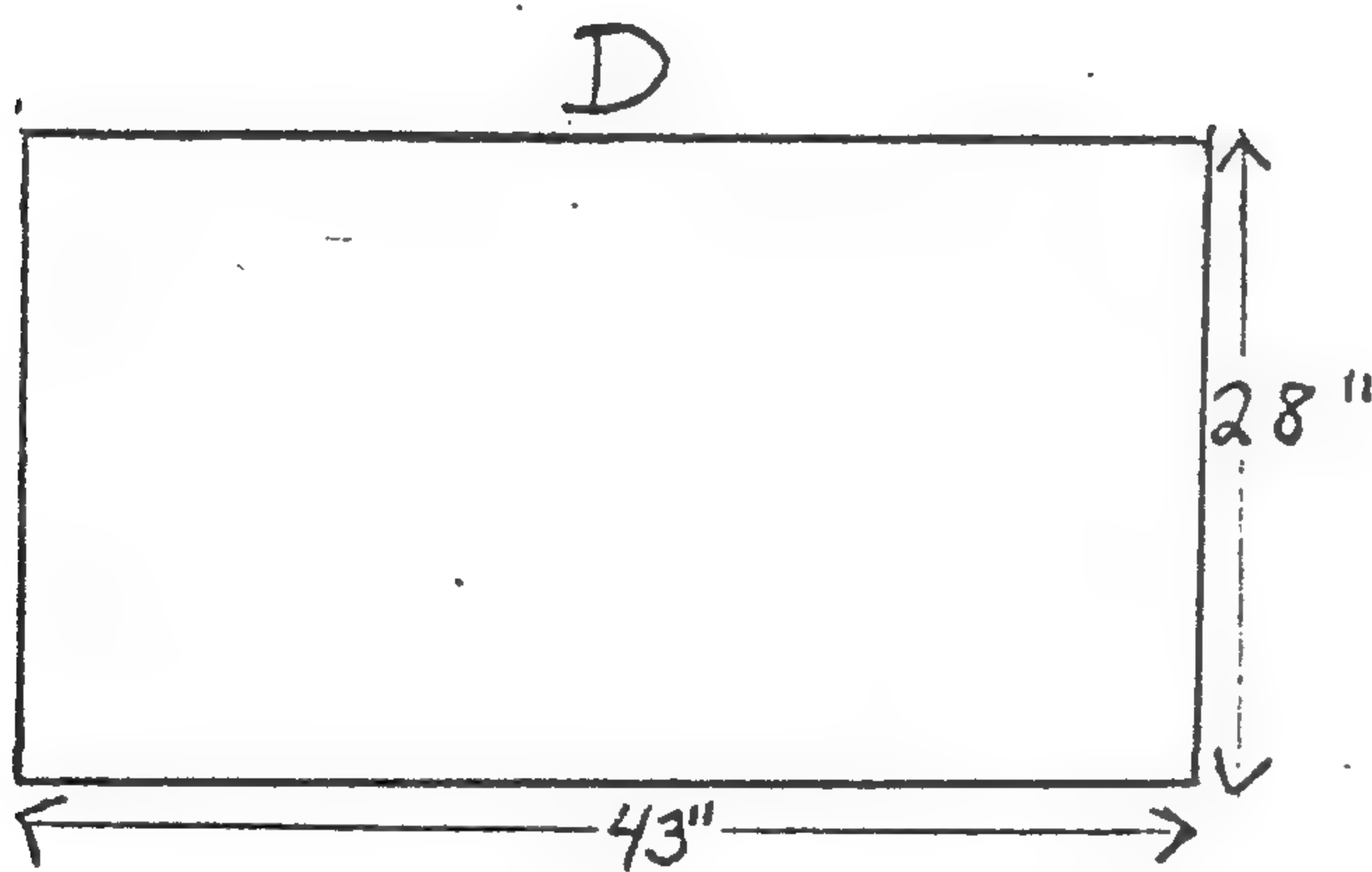
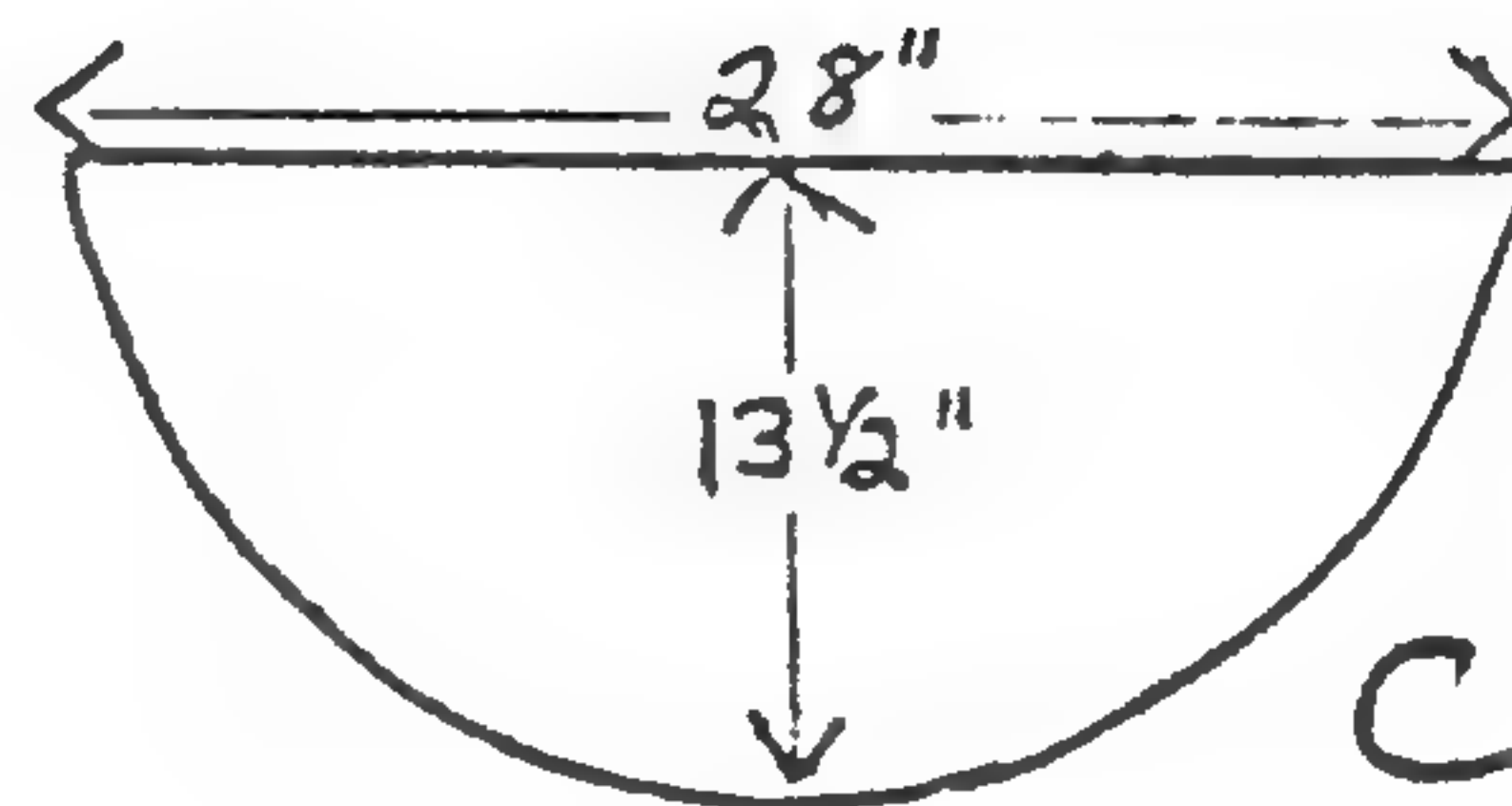
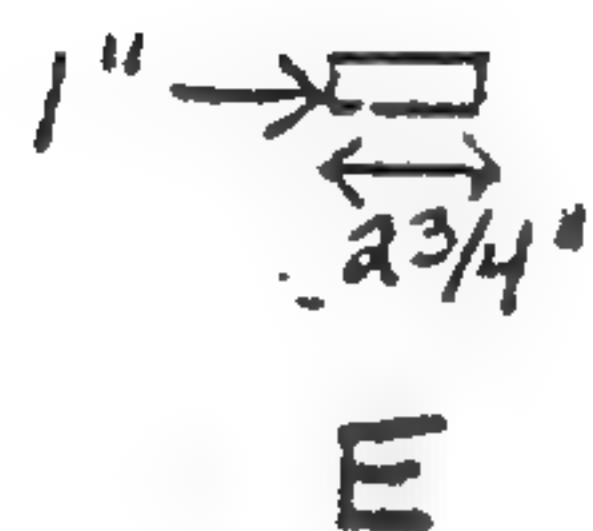
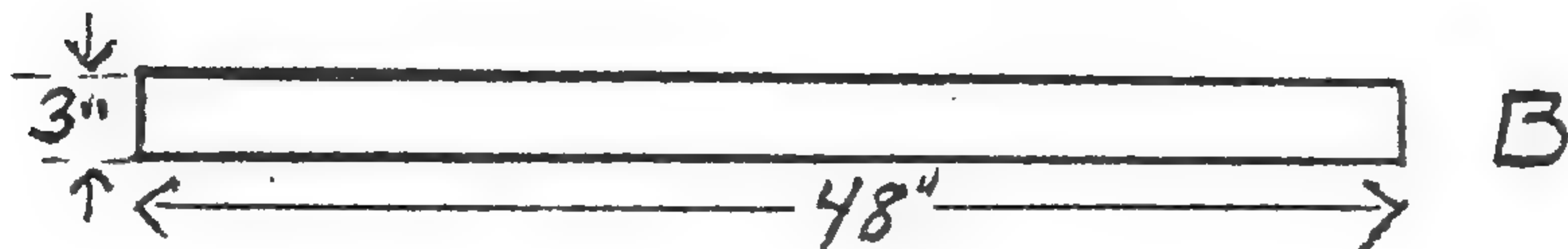
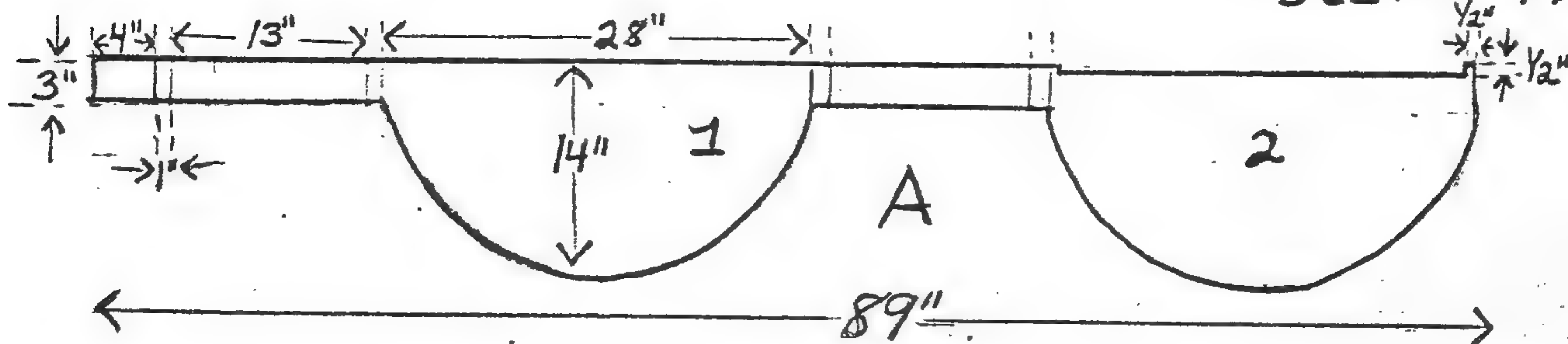
1. Cut 2 A, cutting out slots as indicated on diagram; cut 3 B; cut 4 C, cutting out slots as indicated in diagram; cut 1 D; and Cut 12 E.
2. Score (V groove through top two layers of cardboard) between the 1" marking of the A pieces. Bend to 90°.
3. Glue C pieces on rockers of A's - on the inside of rocker 1 and outside of rocker 2. Tape together with masking tape while drying.
4. Glue, and tape, 4" ends of A's on inside part of rocker 2 to form 2:



5. Place the B's through all the slots.
6. Place D on top - it should sit on the two top B's with the tops of the rockers forming an edge.
7. Turn over, glue and tape all joints very securely.
8. Add E's on both sides of the lowest B support where it goes through rockers to keep rockers from bending in or out.
9. The top 2 B's: fold back the ends and tape down.
10. Paint.
11. Using floor adhesive, glue rug on top.

Vestibular Board

scale $\frac{1}{16}'' = 1''$

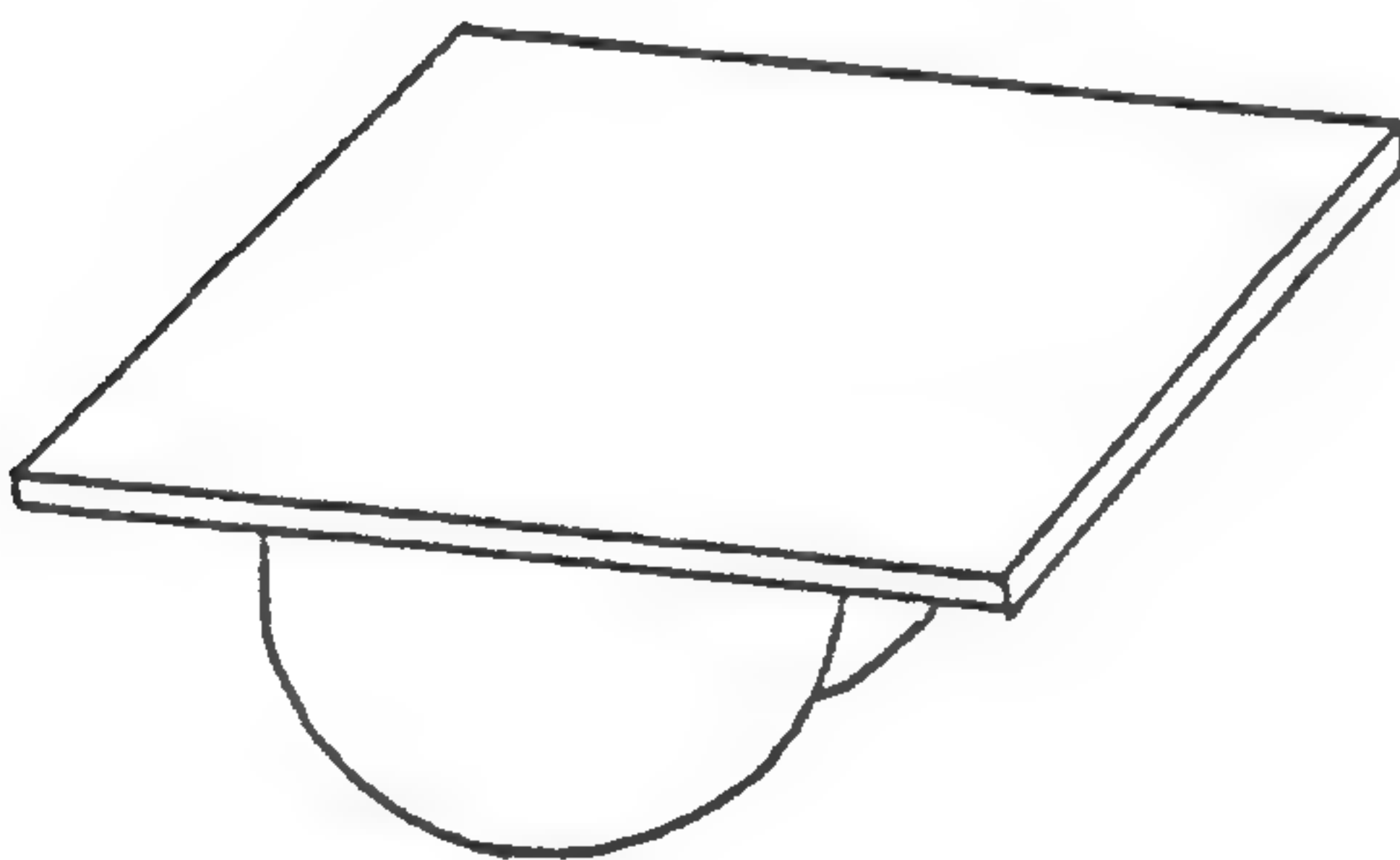


ROCKER BOARD (Small Tilt Board)

- 1) To facilitate righting, equilibrium, and balance reactions in sitting, kneeling, and standing positions.
- 2) To enable weight bearing and weight shifting in upper and lower extremities.
- 3) To stimulate trunk rotation.
- 4) To increase trunk control.
- 5) To provide stimulation of vestibular system in sitting, kneeling, and standing.
- 6) To allow for availability of a rocker board at a nominal cost and with minimal construction time.

Precautions and Considerations:

- 1) Do not leave student unattended on board.
- 2) Take precautions to keep child from falling off the board.
- 3) Be aware of overstimulating or overinhibiting the student- watch for extreme fearfulness, pallor, hyperventilation, perspiration, sudden drowsiness, or dizziness.
- 4) Try to incorporate games into activity to divert attention.
- 5) Prevent board from rocking by placing small blocks under each end of board (check, make sure it doesn't slip).



ROCKER BOARD

Supplies: 15 inch wooden spool cut in half
plywood
cabinet handles
corner brackets
screws

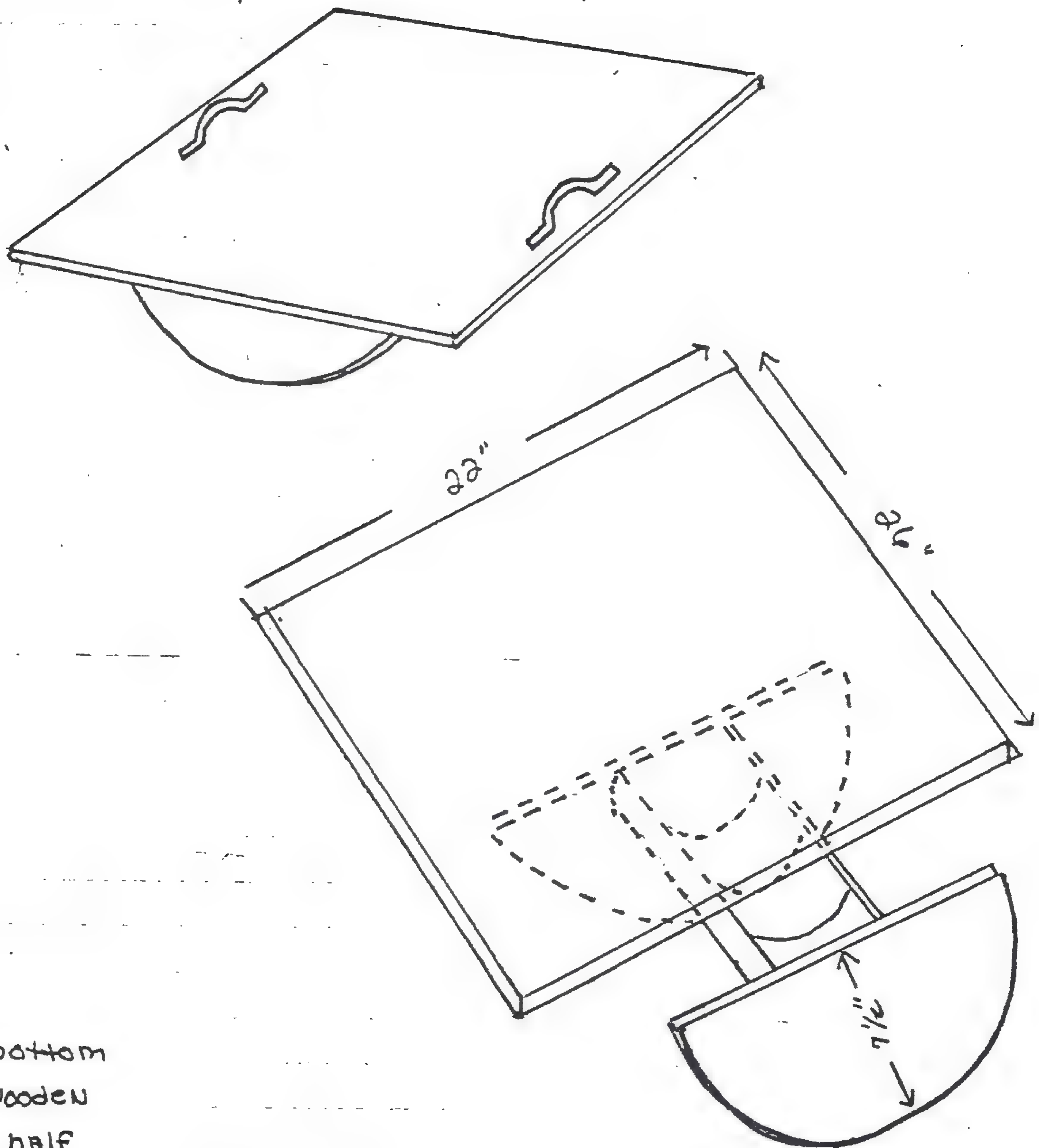
Estimated Cost: wooden spool - 50¢
plywood - \$1
cabinet handles - \$2
corner brackets - \$2
screws - expendible
Total Cost = \$5.50

Directions:

1. Use saber saw to cut spool in half (use knife blade for cardboard piece holding wooden pieces together).
2. Use saber saw (wood blade) to cut plywood - desired size - illustration is 22" X 26".
3. Center straight edges of spool on board. Care must be taken to center spool on bottom of board to allow balancing of the board.
4. Attach spool to plywood using corner brackets (if screws protrude through the top side of the board, filing them down is recommended).
5. Attach the cabinet handles on either side of the board top. This may prevent the child from holding on to the sides of the board and pinched fingers.
6. Sanding rough edges should be done. Covering the top of the board with carpeting may also be done.

NOT DRAWN TO SCALE

Rocker Board



Rockers on bottom
made from wooden
spool cut in half

T - STOOL

- 1) To facilitate righting, equilibrium, and balance reactions in sitting position.
- 2) To enable weight bearing and weight shifting in the lower extremities.
- 3) To stimulate trunk rotation.
- 4) To allow for availability of T-Stool at a nominal cost and with easy construction.

Precautions and Considerations:

- 1) Place mat behind the student for protection in case of falling.
- 2) Take precautions to keep child from falling off the stool.
- 3) Do not leave the student unattended on T-Stool.
- 4) Try to incorporate games into activity to divert attention.

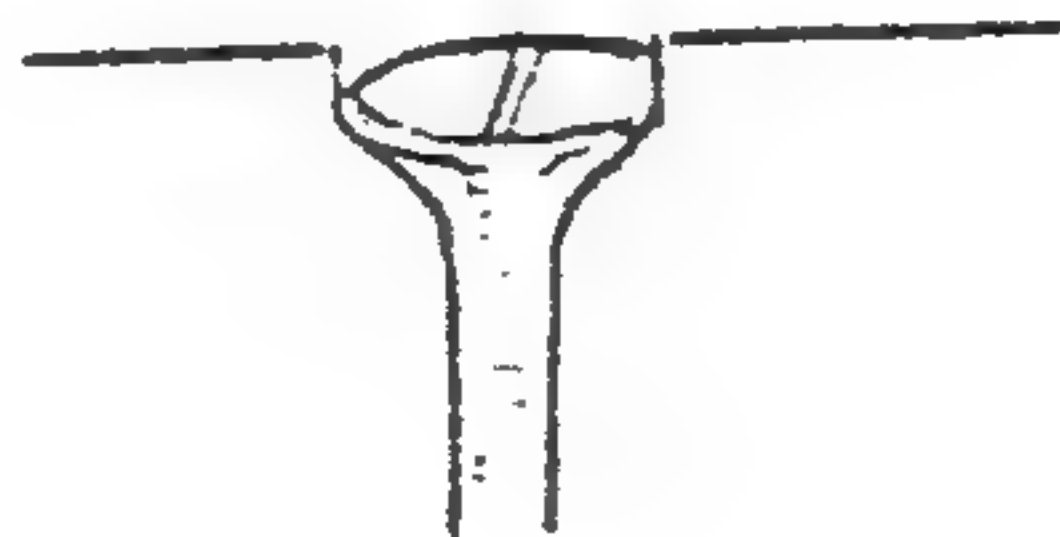
Supplies: 2 pieces wood 12" X 2" X 4"
3 - 4" screws
varnish

Estimated Cost: \$1.00

Directions:

1. Center 1 of the 2" X 4" on top of the other as indicated in diagram.
2. Mark holes for screws where indicated in diagram.
3. Drill holes, countersink screws (make the top of the holes large enough to accomodate screw head):

(screw head is even with surface)

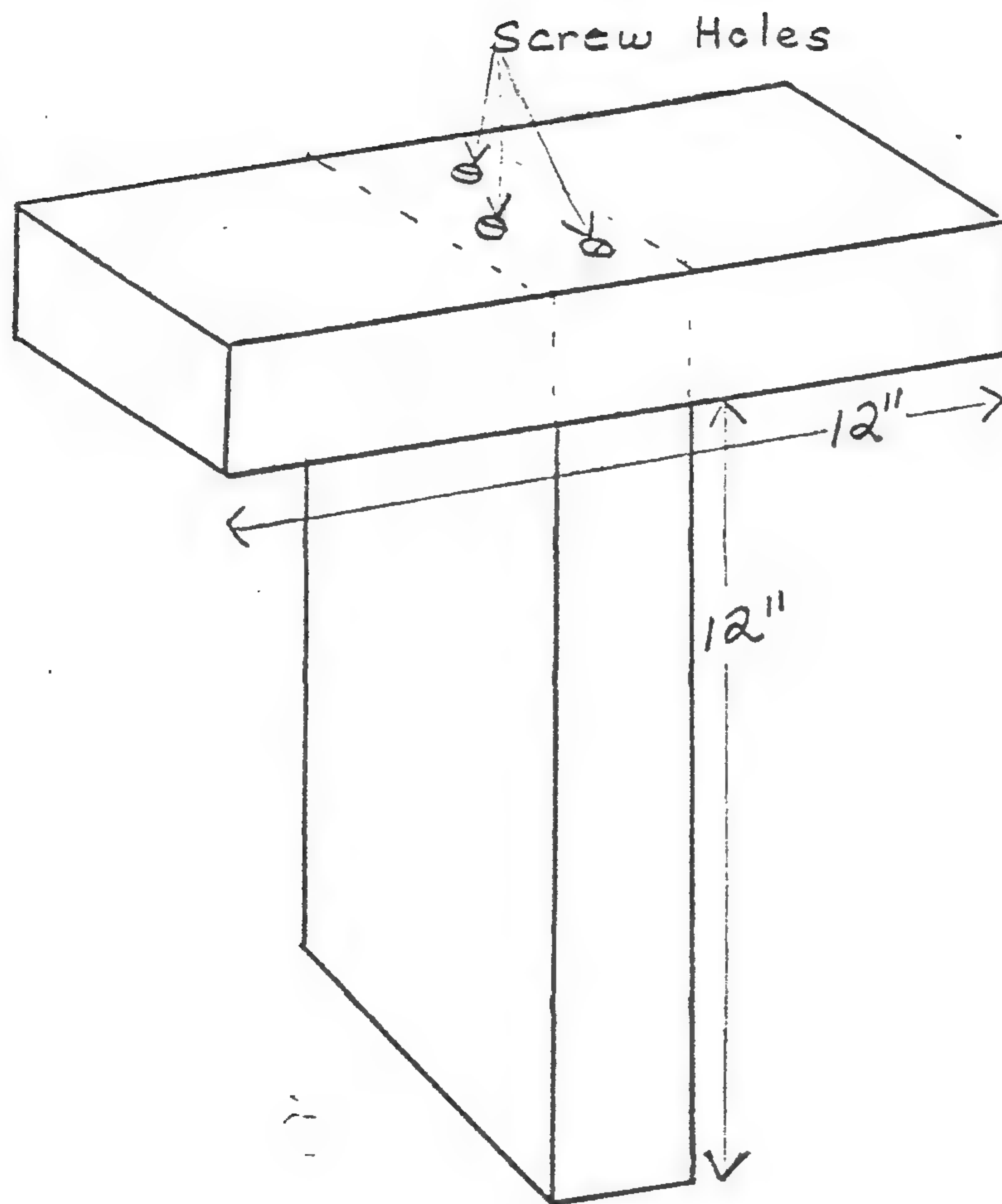


4. Sand, varnish.

Adjusting T-Stool:

1. The height of the stool can be varied by cutting the leg longer or shorter.
2. The T-Stool can require more balance to sit on by cutting the leg on an angle.

T-Stool



drawn to scale

$$\frac{1}{4}'' = 1''$$

STILTS - COFFEE CANS

STILTS - COFFEE CAN

- 1) To facilitate equilibrium and balance reactions in standing.
- 2) To allow for availability of stilts at nominal cost and minimal construction time.

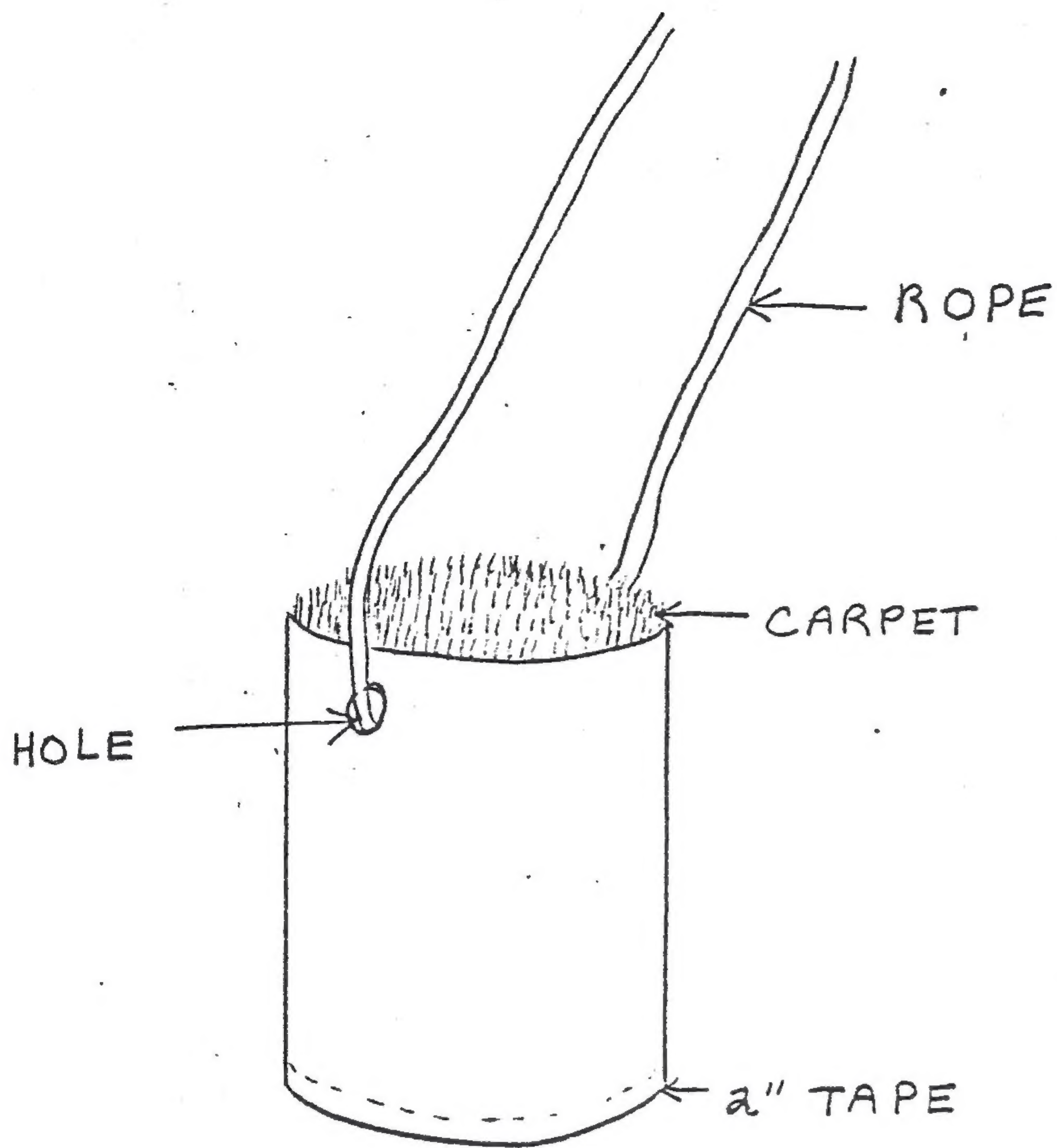
Precautions and Considerations:

- 1) Do not leave student unattended on stilts.
- 2) Take precautions to keep child from falling off the stilts.

Supplies: 2 - 3 lb. coffee cans
carpet
floor adhesive
rope
2" mending date

Estimated Cost: \$1.00

1. Drill or punch holes for rope near top of coffee can.
2. File or tape any sharp edges, including around rim of can.
3. Cut carpet circles to fit top of can. Glue in place with floor adhesive.
4. Place rope through holes, cut to length (both ends hip to waist high). Tie knots.



MAKE 2

Stilts - Coffee Can

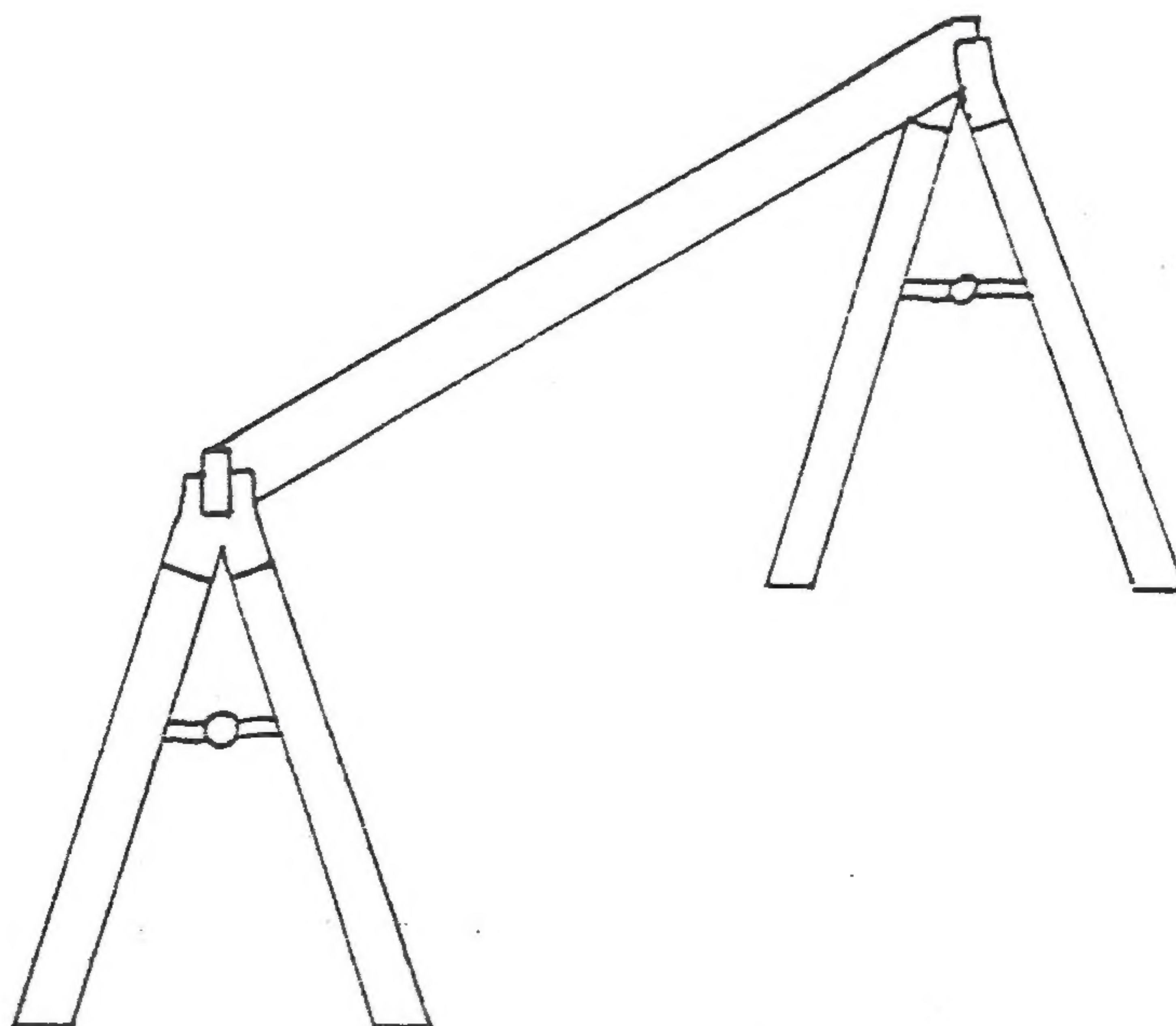
not drawn
to scale

HAMMOCK FRAME

- 1) To provide vestibular stimulation in all planes.
- 2) To facilitate integration of tonic labyrinthine reflexes.
- 3) To facilitate righting, equilibrium, and balance reactions in the prone, supine, sitting, 4 point positions.
- 4) To increase head and trunk control.
- 5) To enhance relaxation in spastic or hyperactive children.
- 6) To increase muscle tone and general state of awareness.
- 7) To allow for availability of hammock for treatment without having to anchor into ceiling or wall.
- 8) To allow for portability of hammock frame.
- 9) To allow for use in small spaces.
- 10) To provide a hammock frame at nominal cost and ease in construction.
- 11) To provide versatility to the hammock (tire swing, platform, etc.).

Precautions and Considerations:

- 1) Do not swing or spin child hard, as frame could fall.
- 2) Do not leave student unattended on frame, as he could topple the frame or another student in class could push it over.
- 3) Take precautions to keep student from falling out of or off apparatus.
- 4) Be aware of overstimulating or overinhibiting the student: be watchful for extreme fearfulness, pallor, hyperventilation, perspiration, sudden drowsiness, or dizziness.
- 5) Do not spin a child with seizures or suspected seizure activity.



HAMMOCK FRAME

Supplies: 4 pieces wood 54 3/4" X 2" X 4"
1 piece wood 68 1/2" X 2" X 4"
2 sawhorse brackets (do not recommend cheap brackets)
2 table leg support hinges
2 mending plates 2" X 10"
3 hooks

Estimated Cost: \$15.00

Directions:

1. Place the 54 3/4" legs in sawhorse brackets.
2. Place 68 1/2" center bar across brackets.
3. Make diagonal cuts on bottom of legs so it sits flat on floor.
4. Attach table leg support hinges as indicated on diagram. Make sure you can fold legs before attaching permanently.
5. Attach mending plates as indicated on drawing. To allow frame to fold, mending plates should be on the same side.

Note: If possible, bend mending plate so that it curves from leg into center bar. Bend by hammering it across metal.

6. Place hooks as indicated in drawing.
7. Sand, varnish.

